

west virginia department of environmental protection

Office of Oil and Gas 601 57th Street SE Charleston, WV 25304 (304) 926-0450 (304) 926-0452 fax Earl Ray Tomblin, Governor Randy C. Huffman, Cabinet Secretary www.dep.wv.gov

October 28, 2014

WELL WORK PERMIT Horizontal 6A Well

This permit, API Well Number: 47-8510165, issued to ANTERO RESOURCES CORPORATION, is evidence of permission granted to perform the specified well work at the location described on the attached pages and located on the attached plat, subject to the provisions of Chapter 22 of the West Virginia Code of 1931, as amended, and all rules and regulations promulgated thereunder, and to all conditions and provisions outlined in the pages attached hereto. Notification shall be given by the operator to the Oil and Gas Inspector at least 24 hours prior to the construction of roads, locations, and/or pits for any permitted work. In addition, the well operator shall notify the same inspector 24 hours before any actual well work is commenced and prior to running and cementing casing. Spills or emergency discharges must be promptly reported by the operator to 1-800-642-3074 and to the Oil and Gas inspector.

Please be advised that form WR-35, Well Operators Report of Well Work is to be submitted to this office within 90 days completion of permitted well work, as should form WR-34 Discharge Monitoring Report within 30 days of discharge of pits, if applicable. Failure to abide by all statutory and regulatory provisions governing all duties and operations hereunder may result in suspension or revocation of this permit and, in addition, may result in civil and/or criminal penalties being imposed upon the operators.

In addition to the applicable requirements of this permit, and the statutes and rules governing oil and gas activity in WV, this permit may contain specific conditions which must be followed. Permit conditions are attached to this cover letter.

Per 35CSR-4-5.2.g this permit will expire in two (2) years from the issue date unless permitted well work is commenced. If there are any questions, please feel free to contact me at (304) 926-0499 ext. 1654.

James Marti

Chief

Operator's Well No: PAIGE UNIT 1H

Farm Name: DEWBERRY, LINDA C. TRUST

API Well Number: 47-8510165

Permit Type: Horizontal 6A Well

Date Issued: 10/28/2014

Promoting a healthy environment.

PERMIT CONDITIONS

West Virginia Code § 22-6A-8(d) allows the Office of Oil and Gas to place specific conditions upon this permit. Permit conditions have the same effect as law. <u>Failure to adhere to the specified permit</u> conditions may result in enforcement action.

CONDITIONS

- This proposed activity may require permit coverage from the United States Army Corps of Engineers
 (USACE). Through this permit, you are hereby being advised to consult with USACE regarding this proposed
 activity.
- 2. If the operator encounters an unanticipated void, or an anticipated void at an unanticipated depth, the operator shall notify the inspector within 24 hours. Modifications to the casing program may be necessary to comply with W. Va. Code § 22-6A-5a (12), which requires drilling to a minimum depth of thirty feet below the bottom of the void, and installing a minimum of twenty (20) feet of casing. Under no circumstance should the operator drill more than fifty (50) feet below the bottom of the void or install less than twenty (20) feet of casing below the bottom of the void.
- 3. When compacting fills, each lift before compaction shall not be more than 12 inches in height, and the moisture content of the fill material shall be within limits as determined by the Standard Proctor Density test of the actual soils used in specific engineered fill, ASTM D698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort, to achieve 95 % compaction of the optimum density. Each lift shall be tested for compaction, with a minimum of two tests per lift per acre of fill. All test results shall be maintained on site and available for review.
- 4. Operator shall install signage per § 22-6A-8g (6) (B) at all source water locations included in their approved water management plan within 24 hours of water management plan activation.
- 5. Oil and gas water supply wells will be registered with the Office of Oil and Gas and all such wells will be constructed and plugged in accordance with the standards of the Bureau for Public Health set forth in its Legislative rule entitled Water Well Regulations, 64 C.S.R. 19. Operator is to contact the Bureau of Public Health regarding permit requirements. In lieu of plugging, the operator may transfer the well to the surface owner upon agreement of the parties. All drinking water wells within fifteen hundred feet of the water supply well shall be flow tested by the operator upon request of the drinking well owner prior to operating the water supply well.
- 6. Pursuant to the requirements pertaining to the sampling of domestic water supply wells/springs the operator shall, no later than thirty (30) days after receipt of analytical data provide a written copy to the Chief and any of the users who may have requested such analyses.
- 7. If any explosion or other accident causing loss of life or serious personal injury occurs in or about a well or well work on a well, the well operator or its contractor shall give notice, stating the particulars of the explosion or accident, to the oil and gas inspector and the Chief, within 24 hours of said accident.
- 8. During the casing and cementing process, in the event cement does not return to the surface, the oil and gas inspector shall be notified within 24 hours.
- 9. Operator shall provide the Office of Oil & Gas notification of the date that drilling commenced on this well. Such notice shall be provided by sending an email to DEPOOGNotify@wv.gov within 30 days of commencement of drilling.



Addendum for Antero pads in Ritchie County, WV

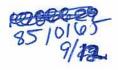
Bow Unit 2H Charlene Pad

The following outlines the process to be undertaken by Antero Resources prior to and during completion process of wells in Ritchie County.

- •Investigate all wells within 1320' of new wells for all identified Marcellus vertical wells and any existing well(s) with an interval that is <u>less than</u> 1500 feet from the deepest formation drilled (including, but not specific to the Alexander formation) to the top of Marcellus:
 - Contact operator of all wells
 - Confirm well status, producing horizon, well completion/stimulation information
 - Discuss plans to stimulate the horizontal Marcellus wells and the plans for monitoring potential impact on shallow wells
 - Make sure all vertical wells (with an interval that is less than 1500 feet from the deepest formation drilled to the top of Marcellus) have adequate wellhead equipment, Including pressure gauges
 - Provide shallow well operator with frac dates and develop plan for monitoring during stimulation
 - If well waters out during frac, shut it in until after stimulation, and install adequate well
 control equipment prior to swabbing in the impacted shallow well
- Control fracturing parameters during job to limit fracture height growth
 - Limit rate and limit pressures for each segment of fracturing stages
- •Tracers demonstrate that we rarely reach offset wells at 660' offset
 - -Will use tracers at each lateral

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Office of Oil and Gas

AUG 21 2014



WW-6B (9/13)

STATE OF WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS WELL WORK PERMIT APPLICATION

1) Well Operat	tor: Antero F	Resources Co	orporation	494488557	085 - Ritchie	Clay	Pennsboro 7.5'
values vie zoon in deem in a committe a sich Com				Operator ID	County	District	Quadrangle
2) Operator's \	Well Number	Paige Unit	1H	Well Pad	Name: Existin	ng Charlen	e Pad
3) Farm Name	/Surface Ow	ner: Linda C	. Dewberry	Trust Public Roa	d Access: CR	74/9	
4) Elevation, c	urrent ground	d: <u>1118'</u>	Ele	evation, proposed j	post-construction	on: 1118'	
5) Well Type	(a) Gas		Oil Underground				
	Other			*			
	(b)If Gas	Shallow	_=_	Deep			
		Horizontal	_=	111 000			
6) Existing Pac							
사람 보았다면서 가게 되었다면 모든	10 TO 10 10 10 10 10 10 10 10 10 10 10 10 10			pated Thickness a 75 feet, Associated			:
8) Proposed To	otal Vertical	Depth: 670	0' TVD	2 1 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2			
9) Formation a	t Total Verti	cal Depth:	Marcellus S	Shale			
10) Proposed T	Total Measur	ed Depth:	14,900' MD				
11) Proposed F	Horizontal Le	g Length:	7587'				
12) Approxima	ate Fresh Wa	ter Strata De	pths:	213', 251'			
13) Method to	Determine F	resh Water I	Depths: _C	Offset well records. Dep	pths have been ad	justed accord	ling to surface elevation
14) Approxima	ate Saltwater	Depths: 5	03', 1433',	1628'			
15) Approxima	ate Coal Sear	n Depths: _	None				
16) Approxima	ate Depth to	Possible Voi	d (coal mi	ne, karst, other):	None anticipated		
17) Does Prope directly overly				ns Yes	No	√	
(a) If Yes, pro	ovide Mine I	nfo: Name	:				
		Depth	:		···		
		Seam:					
		Owne	r:				
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18)

CASING AND TUBING PROGRAM

TYPE	Size	New or Used	Grade	Weight per ft. (lb/ft)	FOOTAGE: For Drilling	INTERVALS: Left in Well	CEMENT: Fill-up (Cu. Ft.)
Conductor	20"	New	H-40	94#	40'	40'	CTS, 38 Cu. Ft.
Fresh Water	13-3/8"	New	J-55/H-40	54.5#/48#	305'	305'	CTS, 424 Cu. Ft
Coal	9-5/8"	New	J-55	36#	2450'	2450'	CTS, 998 Cu. Ft.
Intermediate							
Production	5-1/2"	New	P-110	20#	14,900'	14,900'	3705 Cu. Ft.
Tubing	2-3/8"	New	N-80	4.7#		7,100'	
Liners							

TYPE	Size	Wellbore Diameter	Wall Thickness	Burst Pressure	Cement Type	Cement Yield (cu. ft./k)
Conductor	20"	24"	0.438"	1530	Class A	1.18
Fresh Water	13-3/8"	17-1/2"	0.38"/0.33"	2730/1730	Class A	1.18
Coal	9-5/8"	12-1/4"	0.352"	3520	Class A	1.18
Intermediate						7.2
Production	5-1/2"	8-3/4" & 8-1/2"	0.361"	12630	Lead-H/POZ & Tail - H	H/POZ-1.44 & H-1.8
Tubing	2-3/8"	4.778"	0.19"	11200		
Liners						

PACKERS

Kind:	N/A	
Sizes:	N/A	
Depths Set:	N/A	

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WW-6B (9/13)

19) Describe proposed well work, including the drilling and plugging back of any pilot hole:
Drill, perforate, fracture a new horizontal shallow well and complete Marcellus Shale.
20) Describe fracturing/stimulating methods in detail, including anticipated max pressure and max rate:
Antero plans to pump Slickwater into the Marcellus Shale formation in order to ready the well for production. The fluid will be comprised of approximately 99 percent water and sand, with less than 1 percent special-purpose additives as shown in the attached "List of Anticipated Additives Used for Fracturing or Stimulating Well."
12.70 ovieting cores
21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 13.70 existing acres
22) Area to be disturbed for well pad only, less access road (acres): 6.50 existing acres
23) Describe centralizer placement for each casing string:
Conductor: no centralizers Surface Casing: one centralizer 10' above the float shoe, one on the insert float collar and one every 4th joint spaced up the hole
to surface. Intermediate Casing: one centralizer above float joint, one centralizer 5' above float collar and one every 4th collar to surface. Production Casing: one centralizer at shoe joint and one every 3 joints to top of cement in intermediate casing.
24) Describe all cement additives associated with each cement type:
Conductor: no additives, Class A cement. Surface: Class A cement with 2-3% calcium chloride and 1/4 lb of flake
Intermediate: Class A cement with 1/4 lb of flake, 5 gallons of clay treat
Production: Lead cement- 50/50 Class H/Poz + 1.5% salt + 1% C-45 + 0.5% C-16a + 0.2% C-12 + 0.45% C-20 + 0.05% C-51 Production: Tail cement- Class H + 45 PPS Calcium Carbonate + 1.0% FL-160 + 0.2% ACGB-47 + 0.05% ACSA-51 + 0.2% ACR-20
25) Proposed borehole conditioning procedures:
Conductor: blowhole clean with air, run casing, 10 bbls fresh water.
Surface: blowhole clean with air, trip to conductor shoe, trip to bottom, blowhole clean with air, trip out, run casing kinculated the capacity + 40 bbls fresh water followed by 25 bbls bentonite mud, 10 bbls fresh water spacer.
fresh water followed by 25 bbls bentonite mud, 10 bbls fresh water spacer. Intermediate: blowhole clean with air, trip to surface casing shoe, trip to bottom, blowhole clean with air, trip out, you casing, circulate 40 bbls brine water followed by 10 bbls fresh water and 35 bbls bentonite mud, gump 10 bbls fresh water.
water followed by 10 bbls fresh water and 25 bbls bentonite mud, pump 10 bbls fresh water. Production: circulate with 14 lb/gal NaCl mud, trip to middle of lateral, circulate, pump high viscosity sweep, trip to base producte, pump high viscosity
sweep, trip to top of curve, trip to bottom, circulate, pump high viscosity sweep, trip out, run casing disculate 10 bbls fresh water, pump 48 bbls barite pill, pump 10 bbls fresh water followed by 48 bbls mud flush and 10 bbls water. *Note: Attach additional sheets as needed.
*Note: Attach additional sheets as needed.

API Number 47 -	085	- 10165
Operator's	Well No	. Paige Unit 1H

STATE OF WEST VIRGINIA DEPARTMENT OF ENVIRONMENTAL PROTECTION OFFICE OF OIL AND GAS

FLUIDS/ CUTTINGS DISPOSAL & RECLAMATION PLAN

Operator Name Antero Resources Corporation	OP Code 494488557
Watershed (HUC 10)_Bunnell Run	Quadrangle Pennsboro 7.5'
Elevation 1118 County Ritchie	District Clay
Do you anticipate using more than 5,000 bbls of water to Will a pit be used? Yes No	
11 so, piease describe anticipated pit waste.	It will be used at this site (Drilling and Flowback Fluids will be stored in tanks. Cuttings will be tanked and hauled offsite).
Will a synthetic liner be used in the pit? Yes	
Proposed Disposal Method For Treated Pit Wast	es:
Land Application Underground Injection (UIC I	Parmit Number
	permitted well locations when applicable. API# will be provided on Form WR-34
	WW-9 for disposal location) (Meadowfill Landfill Permit #SWF-1032-98)
Will closed loop system be used? If so, describe: Yes	
Drilling medium anticipated for this well (vertical and hor	izontal)? Air, freshwater, oil based, etc. Oust/Stoff Foam, Production - Water Based Mud
-If oil based, what type? Synthetic, petroleum, e	c. N/A
Additives to be used in drilling medium? Please See Attack	nment
	oved offsite, etc. Stored in tanks, removed offsite and taken to landfill.
-If left in pit and plan to solidify what medium w	
-Landfill or offsite name/permit number? Meadow	
on August 1, 2005, by the Office of Oil and Gas of the W provisions of the permit are enforceable by law. Violati law or regulation can lead to enforcement action. I certify under penalty of law that I have persapplication form and all attachments thereto and that,	and conditions of the GENERAL WATER POLLUTION PERMIT issued est Virginia Department of Environmental Protection. I understand that the ons of any term or condition of the general permit and/or other applicable onally examined and am familiar with the information submitted on this based on my inquiry of those individuals immediately responsible for its true, accurate, and complete. I am aware that there are significant ossibility of fine or imprisonment.
Company Official Signature	REGEIVED
Company Official (Typed Name) Evan Foster	NATALE KOMP Oil and Gas
Company Official Title Environmental Representative	STATE OF COLORADO NOTARY ID # 20144028170 MY COMMISSION EXPIRES DULY TB. 2018
Subscribed and sworn before me this 10th day Natali etamp My commission expires 201	of Sept. Wy20dbartment of Environmental Protection Notary Public

Form WW-9 Additives Attachment

SURFACE INTERVAL

- 1. Fresh Water
- 2. Soap -Foamer AC
- 3. Air

INTERMEDIATE INTERVAL

STIFF FOAM RECIPE:

- 1) 1 ppb Soda Ash / Sodium Carbonate-Alkalinity Control Agent
- 2) 1 ppb Conqor 404 (11.76 ppg) / Corrosion Inhibitor
- 3) 4 ppb KLA-Gard (9.17 ppg) / Amine Acid Complex-Shale Stabilizer
- 4) 1ppb Mil Pac R / Sodium Carboxymethylcellulose-Filtration Control Agent
- 5) 12 ppb KCL / Potassium Chloride-inorganic Salt
- 6) Fresh Water 80 bbls
- 7) Air

PRODUCTION INTERVAL

1. Alpha 1655

Salt Inhibitor

2. Mil-Carb

Calcium Carbonate

3. Cottonseed Hulls

Cellulose-Cottonseed Pellets – LCM

4. Mil-Seal

Vegetable, Cotton & Cellulose-Based Fiber Blend - LCM

5. Clay-Trol

Amine Acid Complex - Shale Stabilizer

6. Xan-Plex

Viscosifier For Water Based Muds

7. Mil-Pac (All Grades)

Sodium Carboxymethylcellulose - Filtration Control Agent

8. New Drill

Anionic Polyacrylamide Copolymer Emulsion - Shale Stabilizer

9. Caustic Soda

Sodium Hydroxide - Alkalinity Control

10. Mil-Lime

Calcium Hydroxide – Lime

11. LD-9

Polyether Polyol - Drilling Fluid Defoamer

12. Mil Mica

Hydro-Biotite Mica – LCM

13. Escaid 110

Drilling Fluild Solvent - Aliphatic Hydrocarbon

14. Ligco

Highly Oxidized Leonardite - Filteration Control Agent

15. Super Sweep

Polypropylene - Hole Cleaning Agent

16. Sulfatrol K

Drilling Fluid Additive - Sulfonated Asphalt Residuum

17. Sodium Chloride, Anhydrous

Inorganic Salt

18. D-D

Drilling Detergent – Surfactant

19. Terra-Rate

Organic Surfactant Blend

20. W.O. Defoam

Alcohol-Based Defoamer

21. Perma-Lose HT

Fluid Loss Reducer For Water-Based Muds

22. Xan-Plex D

Polysaccharide Polymer - Drilling Fluid Viscosifier

23. Walnut Shells

Ground Cellulosic Material - Ground Walnut Shells - LCM

24. Mil-Graphite

Natural Graphite - LCM

25. Mil Bar

Barite - Weighting Agent

26. X-Cide 102

Biocide

27. Soda Ash

Sodium Carbonate - Alkalinity Control Agent

28. Clay Trol

Amine Acid complex - Shale Stabilizer

29. Sulfatrol

Sulfonated Asphalt - Shale Control Additive

30. Xanvis

Viscosifier For Water-Based Muds

31. Milstarch

Starch - Fluid Loss Reducer For Water Based Muds

32. Mil-Lube

Drilling Fluid Lubricant

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Form WW-9			Operator's Well	No Paige Unit 1
Antero Resource	es Corporation		operator a tren	. 10.
Proposed Revegetation Tre	atment: Acres Disturbed 13.70	(existing) Prev	egetation pH	
Lime 2-4	Tons/acre or to correct to pH	6.5	_	
Fertilizer type Hay	or straw or Wood Fiber (will be used y	where needed)		
Fertilizer amount_	500 It	s/acre		
Mulch 2-3	Tons/s	acre		
Existing Existing	Access Road (4.57) + Existing Drill Pad (6.50) + Acres	Existing Spoil Pad "A" (1.79) + Ex	cisting Spoil Pad "B" (0	0.84) = 13.70
Т	emporary		Permanen	t
Seed Type	lbs/acre	Seed 7	Гуре	lbs/acre
Tall Fescue	45	Tall Fescue		45
Perennial Rye Gr	ass 20	Perennial Ry	e Grass	20
*or type of grass seed r	equested by surface owner	*or type of grass	seed requeste	ed by surface owner
Plan Approved by: Comments: Pre	Danf w Chun eseed a muld	all cut	orea	no less
Olar 200 apriation	tor per acre.	manfan	alle	Ny 5 dury
Title: orlay	ras insputor	Date:	9-39EC	EIVED Oil and Gas
			ULI	0 6 2014



Well Site Safety Plan **Antero Resources**

Well Name: Hendershot Unit 1H, Hendershot Unit 1H, Paige

Unit 1H, Paige Unit 2H

Pad Location: CHARLENE PAD

Ritchie County/ Clay District

GPS Coordinates: Lat 39°17'59.27" Long -80°57'49.21" (NAD83)

Driving Directions:

From US-50 heading east turn left onto Co Rd 10/Cabin Run (.3 mi). Turn left onto Co Rd 50/43 (.4 mi). Continue onto Co Rd 50/40/Old US 50 E (2.8 mi). Turn right onto Grey St (.1mi), then slight left to stay on Grey St (.1 mi). Sharp left onto E Penn Ave (.1 mi) and then take the 2nd right onto 1st St (446 ft). Slight right onto WV-74 N/Mountain Dr, continue to follow WV-74 N (1.1 mi). Slight right, and access road will be on the right.

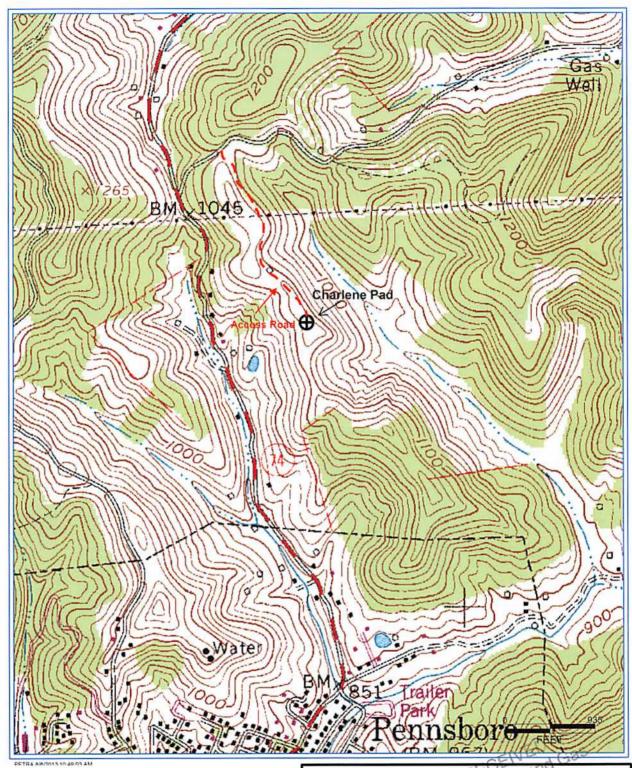
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SEP 202013

WV Department of Environmental Protection



Antero Resources Corporation
Appalachian Basim Cuadrangle: Pennsboro
Watershed: North Fork Hughes River
District: Clay
Date: 8-8-2013

